IN THE CLAIMS:

The claims, as previously and presently presented (with claims 1 and 6 amended) read as follows:

1. (Previously Presented) In a mass spectrometer for analysis of secondary ions and post-ionized neutral secondary particles comprising (a) an ion source to create a primary ion beam to irradiate a sample and create secondary particles, said source possessing a heatable ion emitter that is coated in the area exposed to the field with a liquid-metal layer that contains an ionizable metal that is emitted and ionized as the primary ion beam, wherein the primary ion beam contains metal ions with various stages of ionization and cluster statuses, and (b) a spectrometer unit for mass analysis of the secondary particles, the improvement wherein the liquid metal layer is essentially comprised of pure metallic Bismuth or of a low-melting-point alloy containing, in essence, Bismuth; wherein the ion emitter is wettable by such pure metallic Bismuth or such Bismuth alloy; wherein a Bismuth ion mixed beam can be emitted by the ion emitter under the influence of an

electric field and from which Bismuth ion mixed beam, one of a number of Bismuth ion types, whose mass is a multiple of monatomic singly or multiply charged Bismuth ions $Bi_1^{p+}$, is to be filtered out, using a filtering device, as a mass-pure ion beam that is solely comprised of ions of a type $Bi_n^{p+}$, in which $n \geq 2$ and $p \geq 1$, and n and p are each a natural number;

thereby to increase the efficiency of secondary ion production from the sample, relative to bombardment of the sample with $Au_1^+$ gold ions.

2. (Previously Presented) Mass spectrometer as in Claim 1, wherein the ions filtered out for a mass-pure ion beam belong to one of the following types: $Bi_2^+$, $Bi_3^+$, $Bi_3^{2+}$, $Bi_4^+$, $Bi_5^+$, $Bi_6^+$, $Bi_5^{2+}$, or $Bi_7^{2+}$.

3. (Previously Presented) Mass spectrometer as in Claim 1, wherein the secondary ion mass spectrometer may be operated as a flight-time secondary-ion mass spectrometer.

4. (Previously Presented) Mass spectrometer as in Claim 1, wherein the emission current of the primary-ion beam during operation is between $10^{-8}$ and $5 \times 10^{-5}$ A.

5. (Previously Presented) Mass spectrometer as in Claim 1, wherein a metallic alloy of Bismuth comprises Bismuth and a metal selected from the group consisting of Ni, Ag, Pb, Hg, Cu, Sn, and Zn, whereby an alloy is preferably selected whose melting point lies below that of pure Bismuth.

6. (Previously Presented) In an ion source to create a primary ion beam to irradiate a sample, and to create secondary particles for a mass spectrometer for analysis of secondary ions and post-ionized neutral secondary particles, said source possessing a heatable ion emitter that is coated in the area exposed to the field with a liquid-metal layer that contains an ionizable metal that is emitted and ionized as the primary ion beam, wherein the primary ion beam contains metal ions with various stages of ionization and cluster statuses, the improvement wherein the liquid metal layer is essentially comprised of pure metallic Bismuth or of a low-melting-point alloy containing Bismuth; wherein the ion emitter is wettable by such pure metallic Bismuth or such Bismuth alloy; wherein a Bismuth ion mixed beam can be emitted by the ion emitter under the influence of an electric field, from which Bismuth ion mixed beam, one of a number of Bismuth ion types, whose mass is a multiple of

monatomic singly or multiply charged bismuth ions $Bi_1^{p+}$, is to be filtered out, using a filtering device, ~~in the form of~~ as a mass-pure ion beam that is solely comprised of ions of a type $Bi_n^{p+}$, in which $n \geq 2$ and $p \geq 1$, and n and p are each a natural number;

thereby to increase the efficiency of secondary ion production from the sample, relative to bombardment of the sample with $Au_1^+$ gold ions.

7. (Previously Presented) Ion source as in Claim 6, wherein the metallic alloy of Bismuth is coated with one or more metals selected from the group consisting of Ni, Ag, Pb, Hg, Cu, Sn, or Zn, and wherein an alloy is preferably selected whose melting point lies below that of pure Bismuth.